

RECEIVED

AUG 09 2002



TECH CENTER 1600/2900

ENTERED 1600

RAW SEQUENCE LISTING  
PATENT APPLICATION: US/09/537,710BDATE: 07/31/2002 86  
TIME: 10:02:37Input Set : A:\EP.txt  
Output Set: N:\CRF3\07312002\I537710B.raw

3 <110> APPLICANT: Dahlqvist, Andres  
 4       Stahl, Ulf  
 5       Lenman, Marit  
 6       Banas, Antoni  
 7       Ronne, Hans  
 9 <120> TITLE OF INVENTION: A new class of enzymes in the biosynthetic pathway for the production  
 10      of triacylglycerol and recombinant DNA molecules encoding these enzymes  
 13 <130> FILE REFERENCE: BASFnae337799PCT1-15  
 15 <140> CURRENT APPLICATION NUMBER: US 09/537,710B  
 17 <141> CURRENT FILING DATE: 2000-03-30  
 19 <150> PRIOR APPLICATION NUMBER: EP 99106656.4  
 20 <151> PRIOR FILING DATE: 1999-04-01  
 22 <160> NUMBER OF SEQ ID NOS: 31  
 24 <170> SOFTWARE: WordPerfect version 6.1  
 26 <210> SEQ ID NO: 1  
 27 <211> LENGTH: 1986  
 28 <212> TYPE: DNA  
 29 <213> ORGANISM: Saccharomyces cerevisiae  
 31 <220> FEATURE:  
 32 <221> NAME/KEY: CDS  
 33 <222> LOCATION: (1)..(1983)  
 35 <400> SEQUENCE: 1  
 37 atg ggc aca ctg ttt cga aga aat gtc cag aac caa aag agt gat tct     48  
 38 Met Gly Thr Leu Phe Arg Arg Asn Val Gln Asn Gln Lys Ser Asp Ser  
 39       1               5               10               15  
 41 gat gaa aac aat aaa ggg ggt tct gtt cat aac aag cga gag agc aga     96  
 42 Asp Glu Asn Asn Lys Gly Gly Ser Val His Asn Lys Arg Glu Ser Arg  
 43       20               25               30  
 45 aac cac att cat cat caa cag gga tta ggc cat aag aga aga agg ggt     144  
 46 Asn His Ile His His Gln Gln Gly Leu Gly His Lys Arg Arg Arg Gly  
 47       35               40               45  
 49 att agt ggc agt gca aaa aga aat gag cgt ggc aaa gat ttc gac agg     192  
 50 Ile Ser Gly Ser Ala Lys Arg Asn Glu Arg Gly Lys Asp Phe Asp Arg  
 51       50               55               60  
 53 aaa aga gac ggg aac ggt aga aaa cgt tgg aga gat tcc aga aga ctg     240  
 54 Lys Arg Asp Gly Asn Gly Arg Lys Arg Trp Arg Asp Ser Arg Arg Leu  
 55       65               70               75               80  
 57 att ttc att ctt ggt gca ttc tta ggt gta ctt ttg ccg ttt agc ttt     288  
 58 Ile Phe Ile Leu Gly Ala Phe Leu Gly Val Leu Leu Pro Phe Ser Phe  
 59       85               90               95  
 61 ggc gct tat cat gtt cat aat agc gat agc gac ttg ttt gac aac ttt     336  
 62 Gly Ala Tyr His Val His Asn Ser Asp Ser Asp Leu Phe Asp Asn Phe

RAW SEQUENCE LISTING  
PATENT APPLICATION: US/09/537,710B

DATE: 07/31/2002  
TIME: 10:02:37

Input Set : A:\EP.txt  
Output Set: N:\CRF3\07312002\I537710B.raw

RECEIVED  
AUG 09 2002  
TECH CENTER 1600/2900

63	100	105	110	
65	gta aat ttt gat tca ctt aaa gtg tat ttg gat gat tgg aaa gat gtt			384
66	Val Asn Phe Asp Ser Leu Lys Val Tyr Leu Asp Asp Trp Lys Asp Val			
67	115	120	125	
69	ctc cca caa ggt ata agt tcg ttt att gat gat att cag gct ggt aac			432
70	Leu Pro Gln Gly Ile Ser Ser Phe Ile Asp Asp Ile Gln Ala Gly Asn			
71	130	135	140	
73	tac tcc aca tct tct tta gat gat ctc agt gaa aat ttt gcc gtt ggt			480
74	Tyr Ser Thr Ser Ser Leu Asp Asp Leu Ser Glu Asn Phe Ala Val Gly			
75	145	150	155	160
77	aaa caa ctc tta cgt gat tat aat atc gag gcc aaa cat cct gtt gta			528
78	Lys Gln Leu Leu Arg Asp Tyr Asn Ile Glu Ala Lys His Pro Val Val			
79	165	170	175	
81	atg gtt cct ggt gtc att tct acg gga att gaa agc tgg gga gtt att			576
82	Met Val Pro Gly Val Ile Ser Thr Gly Ile Glu Ser Trp Gly Val Ile			
83	180	185	190	
85	gga gac gat gag tgc gat agt tct gcg cat ttt cgt aaa cgg ctg tgg			624
86	Gly Asp Asp Glu Cys Asp Ser Ser Ala His Phe Arg Lys Arg Leu Trp			
87	195	200	205	
89	gga agt ttt tac atg ctg aga aca atg gtt atg gat aaa gtt tgt tgg			672
90	Gly Ser Phe Tyr Met Leu Arg Thr Met Val Met Asp Lys Val Cys Trp			
91	210	215	220	
93	ttg aaa cat gta atg tta gat cct gaa aca ggt ctg gac cca ccg aac			720
94	Leu Lys His Val Met Leu Asp Pro Glu Thr Gly Leu Asp Pro Pro Asn			
95	225	230	235	240
97	ttt acg cta cgt gca gca cag ggc ttc gaa tca act gat tat ttc atc			768
98	Phe Thr Leu Arg Ala Ala Gln Gly Phe Glu Ser Thr Asp Tyr Phe Ile			
99	245	250	255	
101	gca ggg tat tgg att tgg aac aaa gtt ttc caa aat ctg gga gta att			816
102	Ala Gly Tyr Trp Ile Trp Asn Lys Val Phe Gln Asn Leu Gly Val Ile			
103	260	265	270	
105	ggc tat gaa ccc aat aaa atg acg agt gct gcg tat gat tgg agg ctt			864
106	Gly Tyr Glu Pro Asn Lys Met Thr Ser Ala Ala Tyr Asp Trp Arg Leu			
107	275	280	285	
109	gca tat tta gat cta gaa aga cgc gat agg tac ttt acg aag cta aag			912
110	Ala Tyr Leu Asp Leu Glu Arg Arg Asp Arg Tyr Phe Thr Lys Leu Lys			
111	290	295	300	
113	gaa caa atc gaa ctg ttt cat caa ttg agt ggt gaa aaa gtt tgt tta			960
114	Glu Gln Ile Glu Leu Phe His Gln Leu Ser Gly Glu Lys Val Cys Leu			
115	305	310	315	320
117	att gga cat tct atg ggt tct cag att atc ttt tac ttt atg aaa tgg			1008
118	Ile Gly His Ser Met Gly Ser Gln Ile Ile Phe Tyr Phe Met Lys Trp			
119	325	330	335	
121	gtc gag gct gaa ggc cct ctt tac ggt aat ggt ggt cgt ggc tgg gtt			1056
122	Val Glu Ala Glu Gly Pro Leu Tyr Gly Asn Gly Gly Arg Gly Trp Val			
123	340	345	350	
125	aac gaa cac ata gat tca ttc att aat gca gca ggg acg ctt ctg ggc			1104
126	Asn Glu His Ile Asp Ser Phe Ile Asn Ala Ala Gly Thr Leu Leu Gly			
127	355	360	365	

RAW SEQUENCE LISTING  
PATENT APPLICATION: US/09/537,710B

DATE: 07/31/2002  
TIME: 10:02:37

Input Set : A:\EP.txt  
Output Set: N:\CRF3\07312002\I537710B.raw

129	gct cca aag gca gtt cca gct cta att agt ggt gaa atg aaa gat acc	1152
130	Ala Pro Lys Ala Val Pro Ala Leu Ile Ser Gly Glu Met Lys Asp Thr	
131	370 375 380	
133	att caa tta aat acg tta gcc atg tat ggt ttg gaa aag ttc ttc tca	1200
134	Ile Gln Leu Asn Thr Leu Ala Met Tyr Gly Leu Glu Lys Phe Phe Ser	
135	385 390 395 400	
137	aga att gag aga gta aaa atg tta caa acg tgg ggt ggt ata cca tca	1248
138	Arg Ile Glu Arg Val Lys Met Leu Gln Thr Trp Gly Gly Ile Pro Ser	
139	405 410 415	
141	atg cta cca aag gga gaa gag gtc att tgg ggg gat atg aag tca tct	1296
142	Met Leu Pro Lys Gly Glu Val Ile Trp Gly Asp Met Lys Ser Ser	
143	420 425 430	
145	tca gag gat gca ttg aat aac aac act gac aca tac ggc aat ttc att	1344
146	Ser Glu Asp Ala Leu Asn Asn Thr Asp Thr Tyr Gly Asn Phe Ile	
147	435 440 445	
149	cga ttt gaa agg aat acg agc gat gct ttc aac aaa aat ttg aca atg	1392
150	Arg Phe Glu Arg Asn Thr Ser Asp Ala Phe Asn Lys Asn Leu Thr Met	
151	450 455 460	
153	aaa gac gcc att aac atg aca tta tcg ata tca cct gaa tgg ctc caa	1440
154	Lys Asp Ala Ile Asn Met Thr Leu Ser Ile Ser Pro Glu Trp Leu Gln	
155	465 470 475 480	
157	aga aga gta cat gag cag tac tcg ttc ggc tat tcc aag aat gaa gaa	1488
158	Arg Arg Val His Glu Gln Tyr Ser Phe Gly Tyr Ser Lys Asn Glu Glu	
159	485 490 495	
161	gag tta aga aaa aat gag cta cac cac aag cac tgg tcg aat cca atg	1536
162	Glu Leu Arg Lys Asn Glu Leu His His Lys His Trp Ser Asn Pro Met	
163	500 505 510	
165	gaa gta cca ctt cca gaa gct ccc cac atg aaa atc tat tgt ata tac	1584
166	Glu Val Pro Leu Pro Glu Ala Pro His Met Lys Ile Tyr Cys Ile Tyr	
167	515 520 525	
169	ggg gtg aac aac cca act gaa agg gca tat gta tat aag gaa gag gat	1632
170	Gly Val Asn Asn Pro Thr Glu Arg Ala Tyr Val Tyr Lys Glu Glu Asp	
171	530 535 540	
173	gac tcc tct gct ctg aat ttg acc atc gac tac gaa agc aag caa cct	1680
174	Asp Ser Ser Ala Leu Asn Leu Thr Ile Asp Tyr Glu Ser Lys Gln Pro	
175	545 550 555 560	
177	gta ttc ctc acc gag ggg gac gga acc gtt ccg ctc gtg gcg cat tca	1728
178	Val Phe Leu Thr Glu Gly Asp Gly Thr Val Pro Leu Val Ala His Ser	
179	565 570 575	
181	atg tgt cac aaa tgg gcc cag ggt gct tca ccg tac aac cct gcc gga	1776
182	Met Cys His Lys Trp Ala Gln Gly Ala Ser Pro Tyr Asn Pro Ala Gly	
183	580 585 590	
185	att aac gtt act att gtg gaa atg aaa cac cag cca gat cga ttt gat	1824
186	Ile Asn Val Thr Ile Val Glu Met Lys His Gln Pro Asp Arg Phe Asp	
187	595 600 605	
189	ata cgt ggt gga gca aaa agc gcc gaa cac gta gac atc ctc ggc agc	1872
190	Ile Arg Gly Gly Ala Lys Ser Ala Glu His Val Asp Ile Leu Gly Ser	
191	610 615 620	
193	gcg gag ttg aac gat tac atc ttg aaa att gca agc ggt aat ggc gat	1920

RECEIVED  
AUG 09 2002  
TECH CENTER 1600/2900

RAW SEQUENCE LISTING  
PATENT APPLICATION: US/09/537,710B

DATE: 07/31/2002  
TIME: 10:02:37

Input Set : A:\EP.txt  
Output Set: N:\CRF3\07312002\I537710B.raw

RECEIVED  
AUG 09 2002  
TECH CENTER 1600/2900

194	Ala	Glu	Leu	Asn	Asp	Tyr	Ile	Leu	Lys	Ile	Ala	Ser	Gly	Asn	Gly	Asp
195	625					630				635						640
197	ctc	gtc	gag	cca	cgc	caa	ttg	tct	aat	ttg	agc	cag	tgg	gtt	tct	cag
198	Leu	Val	Glu	Pro	Arg	Gln	Leu	Ser	Asn	Leu	Ser	Gln	Trp	Val	Ser	Gln
199						645				650						655
201	atg	ccc	ttc	cca	atg	taa										
202	Met	Pro	Phe	Pro	Met											
203						660										
206	<210>	SEQ	ID	NO:	2											
207	<211>	LENGTH:	661													
208	<212>	TYPE:	PRT													
209	<213>	ORGANISM:	Saccharomyces cerevisiae													
211	<400>	SEQUENCE:	2													
212	Met	Gly	Thr	Leu	Phe	Arg	Arg	Asn	Val	Gln	Asn	Gln	Lys	Ser	Asp	Ser
213	1					5					10					15
215	Asp	Glu	Asn	Asn	Lys	Gly	Gly	Ser	Val	His	Asn	Lys	Arg	Glu	Ser	Arg
216						20				25						30
218	Asn	His	Ile	His	His	Gln	Gln	Gly	Leu	Gly	His	Lys	Arg	Arg	Arg	Gly
219						35				40						45
221	Ile	Ser	Gly	Ser	Ala	Lys	Arg	Asn	Glu	Arg	Gly	Lys	Asp	Phe	Asp	Arg
222						50				55						60
224	Lys	Arg	Asp	Gly	Asn	Gly	Arg	Lys	Arg	Trp	Arg	Asp	Ser	Arg	Arg	Leu
225						65				70						80
227	Ile	Phe	Ile	Leu	Gly	Ala	Phe	Leu	Gly	Val	Leu	Leu	Pro	Phe	Ser	Phe
228						85				90						95
230	Gly	Ala	Tyr	His	Val	His	Asn	Ser	Asp	Ser	Asp	Leu	Phe	Asp	Asn	Phe
231						100				105						110
233	Val	Asn	Phe	Asp	Ser	Leu	Lys	Val	Tyr	Leu	Asp	Asp	Trp	Lys	Asp	Val
234						115				120						125
236	Leu	Pro	Gln	Gly	Ile	Ser	Ser	Phe	Ile	Asp	Asp	Ile	Gln	Ala	Gly	Asn
237						130				135						140
239	Tyr	Ser	Thr	Ser	Ser	Leu	Asp	Asp	Leu	Ser	Glu	Asn	Phe	Ala	Val	Gly
240						145				150						160
242	Lys	Gln	Leu	Leu	Arg	Asp	Tyr	Asn	Ile	Glu	Ala	Lys	His	Pro	Val	Val
243						165				170						175
245	Met	Val	Pro	Gly	Val	Ile	Ser	Thr	Gly	Ile	Glu	Ser	Trp	Gly	Val	Ile
246						180				185						190
248	Gly	Asp	Asp	Glu	Cys	Asp	Ser	Ser	Ala	His	Phe	Arg	Lys	Arg	Leu	Trp
249						195				200						205
251	Gly	Ser	Phe	Tyr	Met	Leu	Arg	Thr	Met	Val	Met	Asp	Lys	Val	Cys	Trp
252						210				215						220
254	Leu	Lys	His	Val	Met	Leu	Asp	Pro	Glu	Thr	Gly	Leu	Asp	Pro	Pro	Asn
255						225				230						240
257	Phe	Thr	Leu	Arg	Ala	Ala	Gln	Gly	Phe	Glu	Ser	Thr	Asp	Tyr	Phe	Ile
258						245				250						255
260	Ala	Gly	Tyr	Trp	Ile	Trp	Asn	Lys	Val	Phe	Gln	Asn	Leu	Gly	Val	Ile
261						260				265						270
263	Gly	Tyr	Glu	Pro	Asn	Lys	Met	Thr	Ser	Ala	Ala	Tyr	Asp	Trp	Arg	Leu
264						275				280						285

**RAW SEQUENCE LISTING**  
PATENT APPLICATION: US/09/537,710B

DATE: 07/31/2002  
TIME: 10:02:37

Input Set : A:\EP.txt  
Output Set: N:\CRF3\07312002\I537710B.raw

RECEIVED  
AUG 09 2002  
TECH CENTER 1600/2900

266 Ala Tyr Leu Asp Leu Glu Arg Arg Asp Arg Tyr Phe Thr Lys Leu Lys  
267 290 295 300  
269 Glu Gln Ile Glu Leu Phe His Gln Leu Ser Gly Glu Lys Val Cys Leu  
270 305 310 315 320  
272 Ile Gly His Ser Met Gly Ser Gln Ile Ile Phe Tyr Phe Met Lys Trp  
273 325 330 335  
275 Val Glu Ala Glu Gly Pro Leu Tyr Gly Asn Gly Gly Arg Gly Trp Val  
276 340 345 350  
278 Asn Glu His Ile Asp Ser Phe Ile Asn Ala Ala Gly Thr Leu Leu Gly  
279 355 360 365  
281 Ala Pro Lys Ala Val Pro Ala Leu Ile Ser Gly Glu Met Lys Asp Thr  
282 370 375 380  
284 Ile Gln Leu Asn Thr Leu Ala Met Tyr Gly Leu Glu Lys Phe Phe Ser  
285 385 390 395 400  
287 Arg Ile Glu Arg Val Lys Met Leu Gln Thr Trp Gly Gly Ile Pro Ser  
288 405 410 415  
290 Met Leu Pro Lys Gly Glu Glu Val Ile Trp Gly Asp Met Lys Ser Ser  
291 420 425 430  
293 Ser Glu Asp Ala Leu Asn Asn Asn Thr Asp Thr Tyr Gly Asn Phe Ile  
294 435 440 445  
296 Arg Phe Glu Arg Asn Thr Ser Asp Ala Phe Asn Lys Asn Leu Thr Met  
297 450 455 460  
299 Lys Asp Ala Ile Asn Met Thr Leu Ser Ile Ser Pro Glu Trp Leu Gln  
300 465 470 475 480  
302 Arg Arg Val His Glu Gln Tyr Ser Phe Gly Tyr Ser Lys Asn Glu Glu  
303 485 490 495  
305 Glu Leu Arg Lys Asn Glu Leu His His Lys His Trp Ser Asn Pro Met  
306 500 505 510  
308 Glu Val Pro Leu Pro Glu Ala Pro His Met Lys Ile Tyr Cys Ile Tyr  
309 515 520 525  
311 Gly Val Asn Asn Pro Thr Glu Arg Ala Tyr Val Tyr Lys Glu Glu Asp  
312 530 535 540  
314 Asp Ser Ser Ala Leu Asn Leu Thr Ile Asp Tyr Glu Ser Lys Gln Pro  
315 545 550 555 560  
317 Val Phe Leu Thr Glu Gly Asp Gly Thr Val Pro Leu Val Ala His Ser  
318 565 570 575  
320 Met Cys His Lys Trp Ala Gln Gly Ala Ser Pro Tyr Asn Pro Ala Gly  
321 580 585 590  
323 Ile Asn Val Thr Ile Val Glu Met Lys His Gln Pro Asp Arg Phe Asp  
324 595 600 605  
326 Ile Arg Gly Gly Ala Lys Ser Ala Glu His Val Asp Ile Leu Gly Ser  
327 610 615 620  
329 Ala Glu Leu Asn Asp Tyr Ile Leu Lys Ile Ala Ser Gly Asn Gly Asp  
330 625 630 635 640  
332 Leu Val Glu Pro Arg Gln Leu Ser Asn Leu Ser Gln Trp Val Ser Gln  
333 645 650 655  
335 Met Pro Phe Pro Met  
336 660  
340 <210> SEQ ID NO: 3

RECEIVED

AUG 09 2002

TECH CENTER 1600/2900

RAW SEQUENCE LISTING ERROR SUMMARY  
PATENT APPLICATION: US/09/537,710B

DATE: 07/31/2002  
TIME: 10:02:38

Input Set : A:\EP.txt  
Output Set: N:\CRF3\07312002\I537710B.raw

Please Note:

Use of n and/or Xaa have been detected in the Sequence Listing. Please review the Sequence Listing to ensure that a corresponding explanation is presented in the <220> to <223> fields of each sequence which presents at least one n or Xaa.

Seq#:5; N Pos. 2363  
Seq#:7; N Pos. 601,627  
Seq#:7; Xaa Pos. 116,121  
Seq#:9; N Pos. 15,45,83,103,107,112,210  
Seq#:25; N Pos. 240,385  
Seq#:25; Xaa Pos. 41,89  
Seq#:26; N Pos. 601,627  
Seq#:26; Xaa Pos. 116,121  
Seq#:28; N Pos. 15,45,83,103,107,112,210

Invalid Line Length:

The rules require that a line not exceed 72 characters in length. This includes spaces.

Seq#:1; Line(s) 9

VERIFICATION SUMMARY  
PATENT APPLICATION: US/09/537,710B

DATE: 07/31/2002  
TIME: 10:02:38

Input Set : A:\EP.txt  
Output Set: N:\CRF3\07312002\I537710B.raw

L:508 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:5 after pos.:2340  
L:658 M:258 W: Mandatory Feature missing, <220> not found for SEQ ID#:7  
L:662 M:258 W: Mandatory Feature missing, <220> not found for SEQ ID#:7  
L:692 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:7 after pos.:384  
L:703 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:7 after pos.:552  
L:705 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:7 after pos.:612  
L:753 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9 after pos.:0  
L:754 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9 after pos.:60  
L:756 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9 after pos.:180  
L:2277 M:258 W: Mandatory Feature missing, <220> not found for SEQ ID#:25  
L:2291 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:25 after pos.:215  
L:2292 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:25 after pos.:263  
L:2303 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:25 after pos.:359  
L:2304 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:25 after pos.:402  
L:2327 M:258 W: Mandatory Feature missing, <220> not found for SEQ ID#:26  
L:2357 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:26 after pos.:384  
L:2368 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:26 after pos.:552  
L:2370 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:26 after pos.:612  
L:2409 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:28 after pos.:0  
L:2410 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:28 after pos.:60  
L:2412 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:28 after pos.:180